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UNIVERSITI SAINS MALAYSIA

Second Semester Examination  
Academic Session 2007/2008

Peperiksaan Semester Kedua  
Sidang Akademik 2007/2008

APRIL 2008

EPM 322/3 – INDUSTRIAL ENGINEERING  
KEJURUTERAAN INDUSTRI

Duration: 3 hours  
Masa: 3 jam

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**ARAHAN KEPADA CALON :**

Please check that this paper contains **SEVEN** (7) printed pages and **SIX** (6) questions before you begin the examination.

*Sila pastikan bahawa kertas soalan ini mengandungi **TUJUH** (7) mukasurat dan **ENAM** (6) soalan yang bercetak sebelum anda memulakan peperiksaan.*

Please answer **FIVE** (5) questions only.

*Sila jawab **LIMA** (5) soalan sahaja.*

Answer all questions in **English** OR **Bahasa Malaysia** OR a combination of both.

*Pelajar dibenarkan menjawab semua soalan dalam **Bahasa Inggeris** ATAU **Bahasa Malaysia** ATAU kombinasi kedua-duanya.*

Each question must begin from a new page.

*Setiap soalan mestilah dimulakan pada mukasurat yang baru.*

- Q1. [a] Contrast the meanings of the terms job enrichment and job enlargement. Explain two conditions where deployment of job enrichment is better to be deployed than job enlargement.**

*Bandingkan antara terminologi pengkayaan kerja dengan pembesaran kerja. Terangkan dua keadaan yang mana penggunaan pengkayaan kerja lebih sesuai berbanding pembesaran kerja.*

**(25 marks/markah)**

- [b] Japanese firms usually have a policy to rotate their engineers among the different departments whereas American firms are more likely to specialise in a particular department.**

**i) State TWO advantages of each approach.**

**ii) In your opinion, which approach is more suitable for Malaysia. Explain your reasoning.**

*Firma Jepun biasanya mempunyai polisi memutarakan posisi jurutera mereka ke jabatan berlainan, manakala firma Amerika lebih cenderung mengkhususkan ke jabatan tertentu.*

*i) Nyatakan DUA kebaikan bagi setiap pendekatan tersebut.*

*ii) Pada pendapat anda, pendekatan mana lebih sesuai bagi Malaysia. Berikan alasan anda.*

**(30 marks/markah)**

- [c] Three different occupation shown in Table Q2[c] has the following rating.**

	<b>Skill variation <i>Variasi Kemahiran</i></b>	<b>Job identity <i>Jatidiri Kerja</i></b>	<b>Job significance <i>Signifikan Kerja</i></b>	<b>Autonomy <i>Otonomi</i></b>	<b>Feedback <i>Timbal balas</i></b>
<b>Occupation A <i>Pekerjaan A</i></b>	4	3	6	5	6
<b>Occupation B <i>Pekerjaan B</i></b>	6	2	5	5	1
<b>Occupation C <i>Pekerjaan C</i></b>	2	5	7	5	5

**Table Q2[c]  
*Jadual S2[c]***

- i) Which occupation is best in terms of potential motivation? Give a reason for your answer.
- ii) Give situational example to explain difference in job significance and autonomy.

*Tiga Jawatan kerja yang dipamerkan di dalam Jadual S2[c] mempunyai kadaran berikut:*

- i) *Jawatan mana yang terbaik dari segi potensi motivasi. Beri alasan bagi jawapan anda.*
- ii) *Beri contoh situasi bagi menerangkan perbezaan antara jatidiri kerja dengan otonomi.*

**(45 marks/markah)**

- Q2. [a] Productivity ensures employment. Common perception says that productivity improvement will reduce the number of workers. Provide TWO brief arguments that productivity increment indeed ensures employment.**

*Produktiviti menjamin pekerjaan. Pendapat umum biasanya menyatakan peningkatan produktiviti akan menyebabkan jumlah pekerja akan dikurangkan. Berikan DUA hujah ringkas bagi menyokong kenyataan peningkatan produktiviti sebenarnya menjamin pekerjaan.*

**(25 marks/markah)**

- [b] How can POKA YOKE be related to**

- i) **Method improvement**
- ii) **Quality improvement**

*Bagaimanakah POKA YOKE boleh dikaitkan dengan*

- i) *Penambahbaikan Kaedah*
- ii) *Penambahbaikan Kualiti*

**(35 marks/markah)**

- [c] For the year 2005 Telekom Malaysia Bhd (TM) gains RM5 billion from their operations and the gross profit is RM2 billion. In 2006, the revenue increases by 6% while operation cost increases by 4%. Malaysia's inflation rate for the year is 4% while the base-lending rate (BLR) is 6%.**

- i) **Has the productivity for TM improved? Prove your answer.**
- ii) **Ending 2007 compared to 2006, the revenue had decreases by 2% while the cost also reduces by 4%. Is the productivity performance of TM in 2007 better than 2006? Prove your answer.**

*Perolehan Telekom Malaysia Bhd (TM) adalah RM 5 billion dengan keuntungan sebelum cukai sebanyak RM 2 billion. pada tahun 2005. Pada tahun 2006, perolehan TM meningkat 6% manakala kos operasi meningkat kepada 4%. Kadar inflasi di Malaysia berada ditahap 4%. Kadar pinjaman dasar (KPD) ialah 6 % .*

- i) Adakah produktiviti TM meningkat ? Buktikan jawapan anda.*
- ii) Pada tahun berakhir 2007 berbanding tahun 2006, perolehan TM menurun sebanyak 2% manakala kos nya juga menurun sebanyak 4%. Adakah prestasi produktiviti TM lebih baik pada tahun 2007 berbanding prestasi 2006? Buktikan jawapan anda.*

**(40 marks/markah)**

**Q3. [a] Select is the first step in method study,**

- i) List the other steps in method study.**
- ii) Explain briefly the criteria in selecting a task to be studied.**

*Membuat pemilihan (select) merupakan langkah pertama dalam Kajian Kaedah,*

- i) Senaraikan langkah-langkah kajian kaedah yang lain.*
- ii) Terangkan secara ringkas kriteria pemilihan tugas yang akan dikaji.*

**(25 marks/markah)**

**[b] Classify the typical charting techniques commonly used in method study. Explain the differences among the classes.**

*Kelaskan teknik carta-carta yang biasa digunakan di dalam kajian kerja. Terangkan perbezaan di antara kelas-kelas tersebut.*

**(25 marks/markah)**

**[c] You are required to produce beef burger for five people at your home. Your burger consist of beef patty, bun, cabbage, slice cheese and chilli sauce. All the raw material is stored in your refrigerator which is placed in your kitchen. Build a flow process chart for the "production". Include every step and required symbols. Start your chart from the moment you open the refrigerator door and end it when the burgers are served at dining room.**

*Anda dikehendaki membuat sendiri burger daging untuk lima orang di rumah anda. "Burger" anda mengandungi kepingan daging, roti ban, sayur kobis, keju keping, dan sos cili. Semua bahan-bahan mentah berada di dalam peti ais yang terletak di ruang dapur. Bina carta alir proses bagi "pembuatan" tersebut sertakan setiap langkah dan simbol-simbol yang perlu. Mulakan carta anda dari membuka pintu peti ais dan akhiri carta apabila burger itu di hidangkan di ruang makan.*

**(50 marks/markah)**

- Q4. [a] What are the details that should be included when defining the standard method.**

*Nyatakan perincian yang perlu diambil apabila mendefinasi kaedah piawai.*

**(20 marks/markah)**

- [b] Continuous timing method is used to perform direct time study as manual task cycle consisting of four elements: A, B, C, and D. Two components are produced in each cycle. Element D is an irregular element performed once every six cycles. All elements were rated at 92.0%. The PFD allowance is 13.0%. The Q4[b] show the observed time for each element.**

<b>Element</b> <i>Unsur</i>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>Observed time ( min)</b> <i>Masa pemerhatian (min)</i>	0.38	0.63	0.89	1.47

**Table Q4[b]**  
*Jadual S4[b]*

**Determine :**

- i) The normalised time for the cycle
- ii) The standard time per component
- iii) If the worker completes 844 parts in 8 - hour shift during which she works 7 hours and 10 minutes, calculate is the worker's efficiency.

*Kaedah pemsasan berterusan digunakan dalam kajian masa terus suatu kitar tugas insani yang mempunyai empat unsur: A, B, C, dan D. Dua komponen dikeluarkan pada setiap kitar. Unsur D adalah unsur yang tidak menentu yang berfungsi sekali setiap enam kitar. Semua unsur berfungsi pada kadar 92.0%. Elaun PFD ialah 13.0%. Jadual S4[b] menunjukkan masa pemerhatian bagi setiap unsure.*

**Tentukan :**

- i) Masa normal bagi kitar
- ii) Masa piawai bagi setiap komponen
- iii) Jika pekerja menyiapkan 844 komponen di dalam masa 8 jam per syip. Dia berkerja selama 7 jam 10 min, kira kecekapan pekerja tersebut.

**(50 marks/markah)**

- [c] A worker walks 8 steps, bends and picks up a file from the floor, places it on the counter within the reach at that location, and then returns to her original location. Develop the activity sequence model and determine the normal time.

*Seorang pekerja berjalan 8 langkah, bongkok dan mengambil fail daripada lantai, meletakkan fail di atas kaunter dalam ruang yang boleh dicapai pada lokasi tersebut, dan kemudian kembali ke lokasi asal. Bina model turutan aktiviti dan tentukan masa normal.*

(30 marks/markah)

- Q5. [a] Explain the meaning of observation in the sampling stratification.

*Terangkan maksud terma pemerhatian di dalam stratifikasi sampel.*

(30 marks/markah)

- [b] Consider the MOVE element in the MTM table. In particular Case A. Let a distance travel  $x = 5.5$  in, or greater, the element time is linearly related to the distance. The weight factor also affect the time.

- i) If the weight of the object is 17.0 lb, derive the equation that expresses the normal time (in TMU) to move the object as a function of distance  $x$ .
- ii) Check your equation using a distance of  $x = 20$  in, and determine how close it agrees with the tabulated value in motion table.

[ 1 in = 2.54 cm, 1 lb = 400 gram ]

*Pertimbangkan unsur MOVE di dalam jadual MTM terutama bagi Kes A. Katakan jarak  $x = 5.5$  in, atau lebih besar. Masa unsur adalah berkait secara linear dengan jarak. Faktor berat member kesan kepada masa.*

- i) Jika berat objek adalah 17.0 lb, olahkan persamaan yang menyatakan masa normal (dalam TMU) bagi mengerakkan objek sebagai fungsi jarak  $x$ .
- ii) Periksa persamaan yang diperolehi menggunakan jarak  $x = 20$  in, dan tentukan sejauh mana ia menepati nilai jadual pergerakan.

[ 1 in = 2.54 cm, 1 lb = 400 gram ]

(70 marks/markah)

**Q6. [a] What are the significant finding of the Hawthorne studies.**

*Nyatakan signifikan kajian Hawthorne.*

**(25 marks/markah)**

**[b] There are several reasons to implement a direct incentive system. Why this system sometimes fail.**

*Terdapat beberapa sebab untuk melaksanakan sistem insentif terus. Kenapa sistem ini kadang-kadang gagal.*

**(25 marks/markah)**

**[c] A manufacturing company currently shifted to an hourly pay system and uses a rate of RM13.50 per hour. The regular work-week is 40 hours from Monday to Friday. There is no paid sick day benefit. Overtime rate is according to Malaysian labour law.**

**Determine the weekly wage under the following circumstances :**

- i) The employee worked 32 hours during the week and called in sick on Friday.**
- ii) The employee worked 45 hours during the week, including 5 hours overtime on Wednesday evening.**
- iii) The employee was absent on Monday, but worked 8 hours each day for the remaining 4 days of the week and then worked 6 hours on Saturday.**

*Sebuah syarikat pembuatan kini melaksanakan sistem bayaran jam dengan kadar RM13.50 sejam. Lazimnya 40 jam bagi bekerja-seminggu daripada hari Isnin hingga Jumaat. Tiada bayaran bagi pekerja yang bercuti sakit. Kadar lebih masa menurut undang-undang buruh Malaysia.*

**Tentukan upah mingguan bagi keadaan seperti berikut:**

- i) Pekerja bekerja 32 jam seminggu dan cuti sakit pada hari Jumaat.**
- ii) Pekerja bekerja 45 jam seminggu, termasuk 5 jam kerja lebih masa pada petang Rabu.**
- iii) Pekerja tidak hadir pada hari Isnin, tetapi bekerja 8 jam setiap hari selama 4 hari bagi minggu tersebut dan kemudian bekerja 6 jam pada hari Sabtu.**

**(50 marks/markah)**